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(54) Interlocking mechanism

(57) Interlocking mechanism placed in the window sash, interlocking with a slide a longitudinal movement of the sliding slat shifting the bolts of the envelope ferrule or the casement bolt, having bearing surfaces, which mechanism the slide (1) is moved with a lever (4), (15), is put in motion by the pressure of the lever (4), (15) arm onto the side profile of the window frame while closing the window. The lever (4), (15) is mounted pivotably in the lever holder secured to the window sash. The lever is a double-arm lever (4) or a single-arm lever (15).

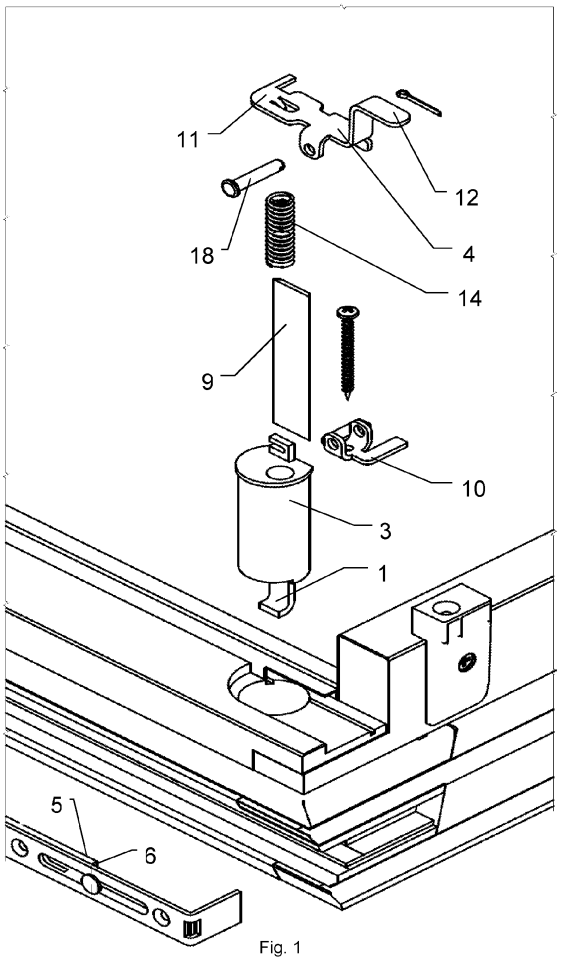

Fig. 1

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Description

[0001] The invention concerns an interlocking mechanism located in a window sash, advantageously of a roof window, that enables longitudinal movement of an envelope ferrule or casement bolt sliding slat to be interlocked or unlocked. This mechanism is functionally connected to an envelope ferrule or a casement bolt, whose one part, secured to the window frame, is fixed, while the other one is a slidable member mechanically connected to a movable handle.

[0002] A solution where the casement bolt interlocking mechanism among others comprises a baseplate, a pivot lever with a sliding finger mounted on the baseplate in the plane perpendicular to the tilt plane of the window sash and the interlocking bolt mounted on the common axis with the pivot lever is known from EP 1 975 358. A turn of the sliding finger causes a turn of the interlocking bolt, which may be in two positions - turning and non-turning, meaning respectively the interlocked and unlocked casement bolt. The finger head, as well as the sliding finger, protrudes perpendicularly to the tilt plane in so that it mates the window frame while closing the sash. The closed sash keeps the mechanism in the turning position, in which the interlocking bolt position enables the movable part of the ferrule to be freely moved. When the sash is open, the mechanism stays in the non-turning position. The interlock of travel of the movable part of the ferrule is based on the angular inserting of the bolt arms into sockets formed in the slidable part of the ferrule, which prevents their movement in both directions.

[0003] A solution similar to the above described, where the casement bolt interlocking mechanism consists of among others a pivot lever installed pivotably on a baseplate in the plane perpendicular to the tilt plane of the window sash and the interlocking bolt mounted on the common axis with the pivot lever is known from the market. When the sash window is being close shut, a turn of the pivot lever and thus the bolt, installed on the common axis, is forced by contact with the window frame. The bolt turns by an angle not exceeding 30° from the non-interlocking position, parallel to the direction of travel of the movable part of the casement bolt into the interlocking position. This turn inserts the bolt arms into sockets formed in the slidable part of the ferrule, causing interlocking of possibility of its movement in both directions.

[0004] Also a solution, in which the envelope ferrule interlocking mechanism comprises among others a baseplate, pivoting tilt mechanism and a latch interlocking the longitudinal movement of the slidable part of the ferrule. The interlocking latch is situated at the height of the pivoting handle. The lock operates on the principle that the interlocking latch protrudes from the window frame tilt plane and mates the movable part of the envelope ferrule while closing and opening the sash in the window frame. During opening or slight opening of the window frame the interlocking latch is extended perpendicularly to the window frame tilt plane, and thus the pivoting movement of the handle, when the window frame is open or ajar, is prevented.

[0005] The common feature of the mentioned solution is a pivoting interlocking member put in motion by the pressure of a lever placed on the side wall of the window sash on the window frame surface while closing the window. However, the lever members protruding beyond the window sash contour located in the area of the handle, make application of such a solution in the case of pivot or tilt-turn roof windows inconvenient. A characteristic feature of such windows is the proximity of internal window installations, e.g. linings, to the window path during closing. Therefore the risk of protruding members clashing with the window installation components increases.

[0006] Also a solution where the interlocking slide is installed in the same housing as the handle mechanism is known from the market. It is shifted by the pressure of the window frame on a specially formed arm during the window closing. However this solution enables the movement of one of the sliding slats to be interlocked only in one direction. So the opposite direction remains unlocked or this function must be transferred to another window mechanism, e.g. a handle. A solution like this forces also a significant increase of the common housing of the handle and the movement interlock.

[0007] The objective of this solution is such a design of the mechanism interlocking the longitudinal movement of the sliding slat shifting the bolts of the envelope ferrule or casement bolt, that enables the position of the sliding slat to be easily changed by the turn of the handle in the closed position of the window sash and interlocks its extension in another position. It will protect the window frame structure from a damage by protruding bolts during closing of the sash window. In tilt-turn windows the sliding slat is unlocked when the window sash is open, while changing its position from closed to open or tilted, and interlocked both in the open and the tilt position. In tilt windows this mechanism also efficiently prevents the possibility of handle turn and movement of the sliding slat when the window sash is ajar, protecting the window frame and other window components against a damage by protruding bolts during forced or accidental closing of the window sash.

[0008] The essence of the invention is a mechanism using a slide shifted by a lever for interlocking the longitudinal movement of the sliding slat of the envelope ferrule or casement bolt, advantageously located in one on the window sash corners, which in the interlocked position completely prevents a shift of the sliding slat re-setting the bolts and consequently stops the possibility of a change of the position of handle or casement bolt holder while the window is open. While the window sash is closed the interlocking mechanism enables the sliding slat to shift freely and the bolts to be re-set into the position interlocking the window sash opening. The sliding slat has bearing surfaces for interlocking its movement, mating the slide. Depending on the function performed, the sliding slat can have one bearing surface for inter-

locking movement only in one direction, or at least two bearing surfaces for interlocking movement in both directions. In the first case it is most often the end surface of the sliding slat. In the case of two bearing surfaces, they can be e.g. opposite walls of a rectangular or trapezoidal recess in the sliding slat.

[0009] The slide positioned advantageously perpendicularly to the sliding slat, may be advantageously L-shaped, where the shorter, interlocking arm contacts the bearing surface of the sliding slat, while the longer, guiding arm moves in the guide shaped in the guide bushing and is engaged to the lever.

[0010] An advantage of a slide shape like this is more freedom in location of the guide bushing in the window sash profile. The relative position of the guide bushing, and thus the whole mechanism, and the sliding slat with a bearing surface may be adjusted by a change in the L-shaped slide interlocking arm length. The guide bushing may be the only member with a hollowed guide with its shape matching the shape of the slide guiding arm, it can also be, for process reasons, a member with an open guide, covered e.g. with a spacer shielding the slide from the side profile structure and at the same time ensuring the possibility of only longitudinal guiding of the slide.

[0011] When a L-shaped slide is applied, it can be shifted with both a single-arm and a double-arm lever. A double-arm lever reverses the slide movement direction relative to the direction of the force causing the lever movement. In the case of the proposed solution, the direction of the exciting force effect is opposite to the direction of the window sash closing and perpendicular to its tilt plane, therefore the slide makes the unlocking movement in line with the window sash closing direction. It stems from the system kinematics, where the lever useful force arm, supported by the lever holder, is connected to the slide in a pivoting-sliding manner, and the acting force arm, while closing the window sash, is mating the side profile of the window frame having a bumper in the place of contact with the lever.

[0012] The lever is shifted to the interlocking position of the mechanism with the spring tension force, which at the other end is restrained advantageously in the guide bushing body. When the spring is secured to the useful force arm, a compressed spring is applicable. However, if it is secured to the acting force arm, it should be a tension spring. Any springy component with a sufficient tension force and durability may also be used instead of a spring. It follows from the above that the interlocking position is a natural position of the mechanism and it may be changed to the unlocked position by applying an external exciting force.

[0013] The slide is shifted to the unlocked position by a pressure of the lever onto the bumper installed on the side profile of the window frame structure while closing the window. In this slide position a free movement of the envelope ferrule or casement bolt sliding slat is possible, and thus e.g. a turn of the handle. The interlocking slide arm in this position should be located on the opposite, relative to the lever position, side of the sliding slat. At the same time the spring is compressed - or stretched in the case of location on the opposite side of the lever holder. After insignificant opening of the window sash the pressure of the acting force arm on the bumper is released and the reverse movement of the slide to the interlocking position occurs, which is forced by the spring tension force.

[0014] When a single-arm lever is used, the slide makes an interlocking movement opposite to the direction of the window sash opened, thus the guiding arm of the slide is shorter, and the interlocking arm is on the same side of the sliding slat as the whole interlocking mechanism. The execution of the bearing surfaces in the sliding slat may be similar as in the case of the earlier described double-arm lever. The specificity of the solution of the mechanism with a single-arm lever requires a tension spring to be used, secured either to the guide bushing or directly to the window sash. The other end of the spring may be secured at any distance to the lever axis of rotation. It is restricted only by the required minimum tension force and design constraints. A design like this gives more freedom in shaping of the slide, which may have a similar L-shape, as in the previous case. It may also be a straight member or may have the shape resulting from other dependencies, in addition each of those solutions should contain a part guided in the guide and an interlocking part mating the bearing surfaces of the sliding slat.

[0015] The design of the casement bolt and envelope ferrule interlocking mechanism is characterised by a relatively simple structure, low manufacturing cost and ease of assembly. A significant advantage of the proposed solution is the lack of uncovered and protruding beyond the window sash contour members of the interlocking mechanism, both in the unlocked and the interlocked position. It results from the location of the mechanism advantageously in the window sash corner, as well as from the fact that in the case of roof windows, the mechanism components are largely covered by the window sash sheeting. Therefore the risk of accidental damage of the structure or catching protruding members with a part of clothing is eliminated. Unquestionable advantages of such design are also aesthetic qualities and versatility of the solution, allowing the proposed solution to be applied in most of existing solutions of envelope ferrules and casement bolts.

[0016] The solution according to the invention is presented in embodiment examples in the drawings. The complete component set of the interlocking mechanism with a double-arm lever and mating components of the sash window ferrule is presented in Fig. 1 in the form of an assembly drawing with exploded view, whereas Fig. 2 presents an isometric view of this mechanism in the unlocked position. Fig.3, which is a cross-section, presents the interlocking mechanism with a double-arm lever in the interlocking position, installed in the window sash and mating the window frame, while Fig. 4 in the

same arrangement shows the interlocking mechanism in the unlocked position. Fig.5 shows the full cross-section of the mechanism with a single-arm lever in the unlocked position, while Fig. 6 in the same arrangement shows the interlocking mechanism in the locked position.

[0017] In the first embodiment example the interlocking mechanism, shown in connection with the window sash and components of the envelope ferrule on drawings Fig. 1 and Fig. 2, located in one of the sash corners, consists of a slide 1 moving in the guide 2 formed in the guide bushing 3 and secured in a pivoting-sliding manner in the double-arm lever 4. The slide 1 is used for interlocking the longitudinal movement of the sliding slat 5 of the envelope ferrule or casement bolt. The slide as an interlocking member may be in two positions: the interlocking and the unlocked one. In the interlocking position the slide 1 completely prevents the sliding slat 5 from shifting towards extending from the sash, thus blocking the possibility of a change in the handle or casement bolt holder position in this direction. A condition like this is required e.g. in the case of open window sash. The sliding slat 5 has one bearing surface 6 advantageously being its end surface. As a variant of the proposed solution, it is possible to form the sliding slat with two or more bearing surfaces for interlocking its movement in both directions. Such surfaces may be formed for instance as opposite walls of the rectangular recess in the sliding slat, where the slide is advantageously perpendicularly put in, thus eliminating the possibility of a shift of the sliding slat.

[0018] The slide is advantageously L-shaped. Its interlocking arm 7 contacts the bearing surface 6 of the sliding slat 5. The slide is moved with the double-arm lever 4 through the guiding arm 8, sliding in the guide 2 with its shape matching the shape of this arm 8. The shape of the guide bushing 3 is determined, in its basic part, by a cylinder cut on its whole length with an advantageously flat surface parallel to the surface of the slide 1 sliding in the guides. As a result the guide 2 is open on one side, which facilitates the slide 1 assembly. The guide 2 is covered with a spacer 9 causing the full interlocking of the unfavourable traversing of the slide. In addition, the spacer is used for angular restrain of the bushing after adjusting its position. The inconvenience caused by an unwanted possibility of the bushing turn in the round socket during operation may be eliminated by using different, not round shapes of the section of the bushing itself or the socket where the bushing is placed. However it is associated with a processing inconvenience of manufacturing such a socket.

[0019] The slide 1 is shifted with the double-arm lever 4 supported pivotably on the lever holder 10. The useful force arm 11 of the double-arm lever 4 is connected to the slide 1 in a pivoting-sliding manner, and the acting force arm 12, while closing the window sash, mates the side profile of the window frame with a bumper 13 in the place of contact with the acting force arm 12. When the double-arm lever 4 is used for driving the slide 1, the direction of the exciting force effect is opposite to the direction of closing the window sash and perpendicular to its tilt plane. As a result the slide 1 makes an unlocking movement in line with the direction of the window sash movement direction, as shown in Fig. 3, assuming that the guide bushing 3 is installed perpendicularly to the tilt plane of the window sash.

[0020] The double-arm lever 4 is held in the mechanism interlocking position, as in Fig. 3 with a spring 14 being compressed, secured to the useful force arm 11, which with its other end is restrained in the guide bushing 3 body. In another variant of this solution the spring 14 may be secured to the acting force arm 12 and in this case it should be a tension spring. It follows from the above that the interlocking position is a natural position of the mechanism and it may be changed to the unlocked position by applying an external exciting force.

[0021] The slide 1 is shifted, as shown in Fig. 4, to the unlocked position by a pressure of the double-arm lever 12 on the bumper 13 installed on the side profile of the window frame while closing the window. The location of individual components of the mechanism in the unlocked position is shown in Fig. 4, where arrows indicate the direction of the interlocking movement. In this position of slide 1 a free movement of the envelope ferrule or casement bolt sliding slat 5 is possible, and thus e.g. a turn of the handle. The interlocking slide 1 arm 7 in this position is located on the opposite side of the sliding slat 5, relative to the position of other components of the interlocking mechanism. At the same time the spring 14 is compressed. After opening of the window sash the pressure of the acting force arm 12 on the bumper 13 is released and the return movement of the slide to the interlocking position occurs, which is forced by the spring 14 tension force.

[0022] In the second embodiment example a single-arm lever 15 was used instead of the double-arm lever 4 from the first embodiment, which is shown in Fig. 5. The lever design like this means the location of its point of support at one of its ends, opposite to the point of the force effect in the place of contact with the bumper 13. The single-arm lever 15, supported pivotably or pivotably-slidably in the point of support in the form of a single-arm lever holder 16, puts in motion the slide 1, secured pivotably on the arm of the single-arm lever 15, between the lever point of support and the point of force effect. The slide 1 in this configuration may have the blocking part identical as in the first embodiment example in the form of a blocking arm 7, it may also have any other shape meeting the condition of engaging with the sliding slat 5 after re-setting the mechanism into the interlocking position.

[0023] The slide 1 in the interlocking position makes an unlocking movement in the direction opposite to the direction of the window sash closing, and the interlocking arm 7 or another component of the slide 1 performing the interlocking function is on the same side of the sliding slat 5 as the whole interlocking mechanism. The mechanism in the unlocked position is shown in Fig. 5. The

slide may have the L-shape, or it may also be a straight member, in addition each of these solutions should contain a guiding arm 8 in the guide 2 and an interlocking part, mating the bearing surfaces of the sliding slat 5. The method of execution of the bearing surfaces in the sliding slat is similar as in the first embodiment example.

[0024] While opening the window sash the pressure of the single-arm lever 15 on the bumper 13 is released and the return movement of the slide to the interlocking position, shown in Fig. 6, occurs, which is forced by the tension force of the tension spring 17 secured to the guide bushing 3. The other end of the tension spring 17 is secured to the arm of the single-arm lever 15.

[0025] In the third embodiment example, not shown in the drawings, the interlocking mechanism has the design and principle of operation essentially similar to the design described in the first example. The differentiating feature is the type of the spring used, which in this case is a torsion spring, advantageously wound up on a pin 18, connected with one end to the fixed lever holder 10, and with the other one to the double-arm lever 4.

Claims

1. Interlocking mechanism placed in the window sash, advantageously of a roof window, interlocking with a slide a longitudinal movement of the sliding slat shifting the bolts of the envelope ferrule or the casement bolt, having bearing surfaces, **characterised in that** the slide (1) is moved with a lever (4), (15).

2. Interlocking mechanism as claimed in claim 1, **characterised in that** it is put in motion by the pressure of the lever (4), (15) arm onto the side profile of the window frame while closing the window.

3. Interlocking mechanism as claimed in claim 1, **characterised in that** the lever (4), (15) is mounted pivotably in the lever holder secured to the window sash.

4. Interlocking mechanism as claimed in claim 1, **characterised in that** the lever is a double-arm lever (4).

5. Interlocking mechanism as claimed in claim 1, **characterised in that** the lever (4) is supported on the holder of the double-arm lever (10) and the useful force arm (11) of the lever mates the slide (1), and the acting force arm (12) mates the side profile of the window frame.

6. Interlocking mechanism as claimed in claim 1, **characterised in that** the slide (1) is L-shaped, in addition the interlocking arm (7) contacts the bearing surface (6) of the sliding slat (5), and the guiding arm moves in the guide (2).

7. Interlocking mechanism as claimed in claim 1, **characterised in that** the lever is a single-arm lever (15).

8. Interlocking mechanism as claimed in claim 16, **characterised in that** the arm of the single-arm lever (15), supported in the single-arm lever holder (16) mates the slide (1) and the side profile of the window frame.

9. Interlocking mechanism as claimed in claim 1, **characterised in that** the slide (1) is a straight profile moving in the guide (2), engaged to the single-arm lever (15).

10. Interlocking mechanism as claimed in claim 1, **characterised in that** the interlocking mechanism is located in one corner of the window sash.

11. Interlocking mechanism as claimed in claim 1, **characterised in that** the sliding slat (5) has at least one bearing surface (6) for interlocking the movement, mating the slide (1).

12. Interlocking mechanism as claimed in claim 1, **characterised in that** the lever (4), (16) is held in the interlocked position of the interlocking mechanism with a spring, in the case of a double-arm lever (4) - a compressed spring (14), in the case of a single-arm lever (15) - a tension spring (17).

13. Interlocking mechanism as claimed in claim 12, **characterised in that** the spring (14), (17) is restrained in the guide bushing.

14. Interlocking mechanism as claimed in claim 1, **characterised in that** the slide (1) moves in the guide (2), shaped in the guide bushing (3).

15. Interlocking mechanism as claimed in claim 16, **characterised in that** the window frame has a bumper (13) in the place of contact with the lever, located in the side profile of the window frame.

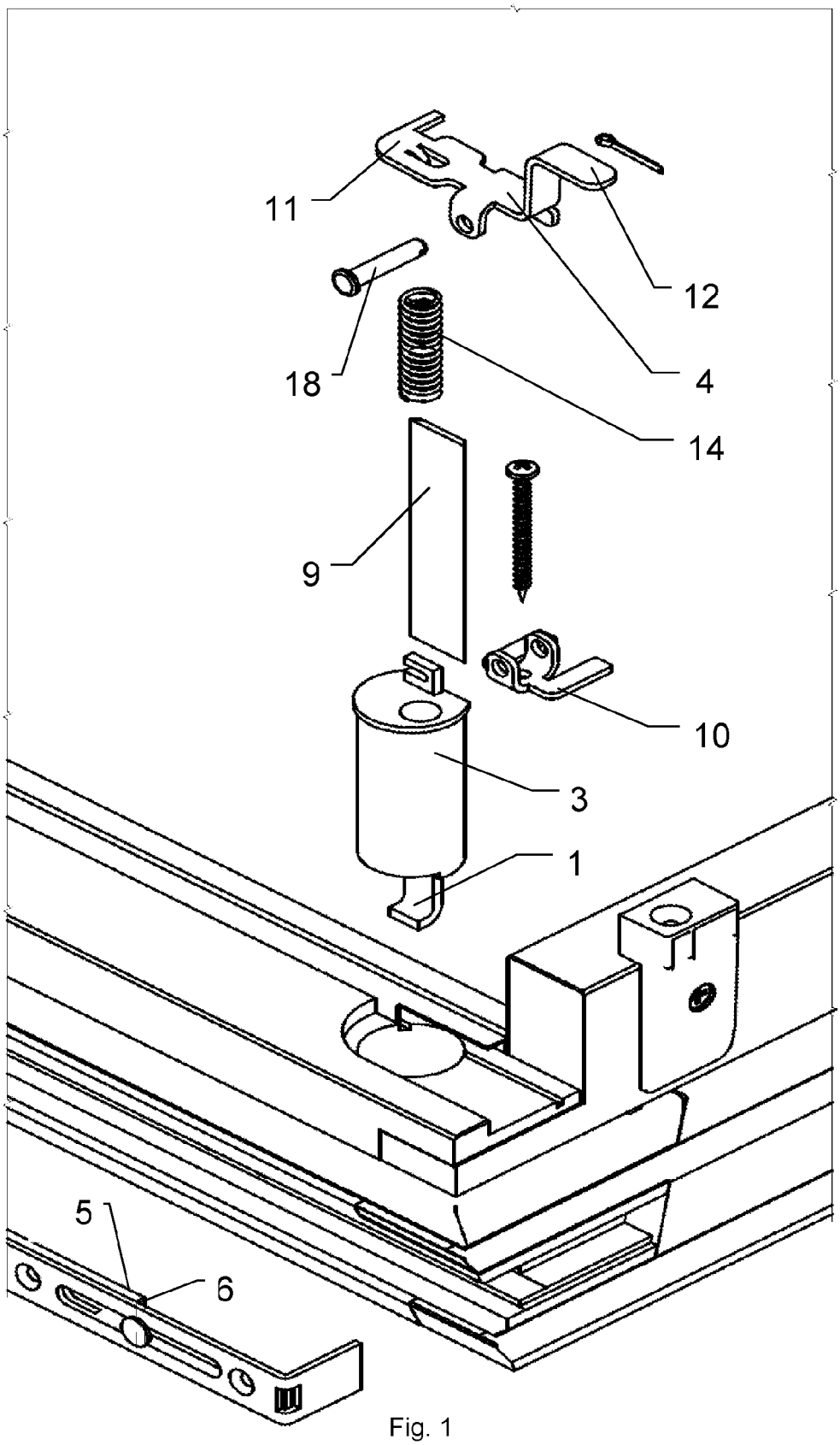

Fig. 1

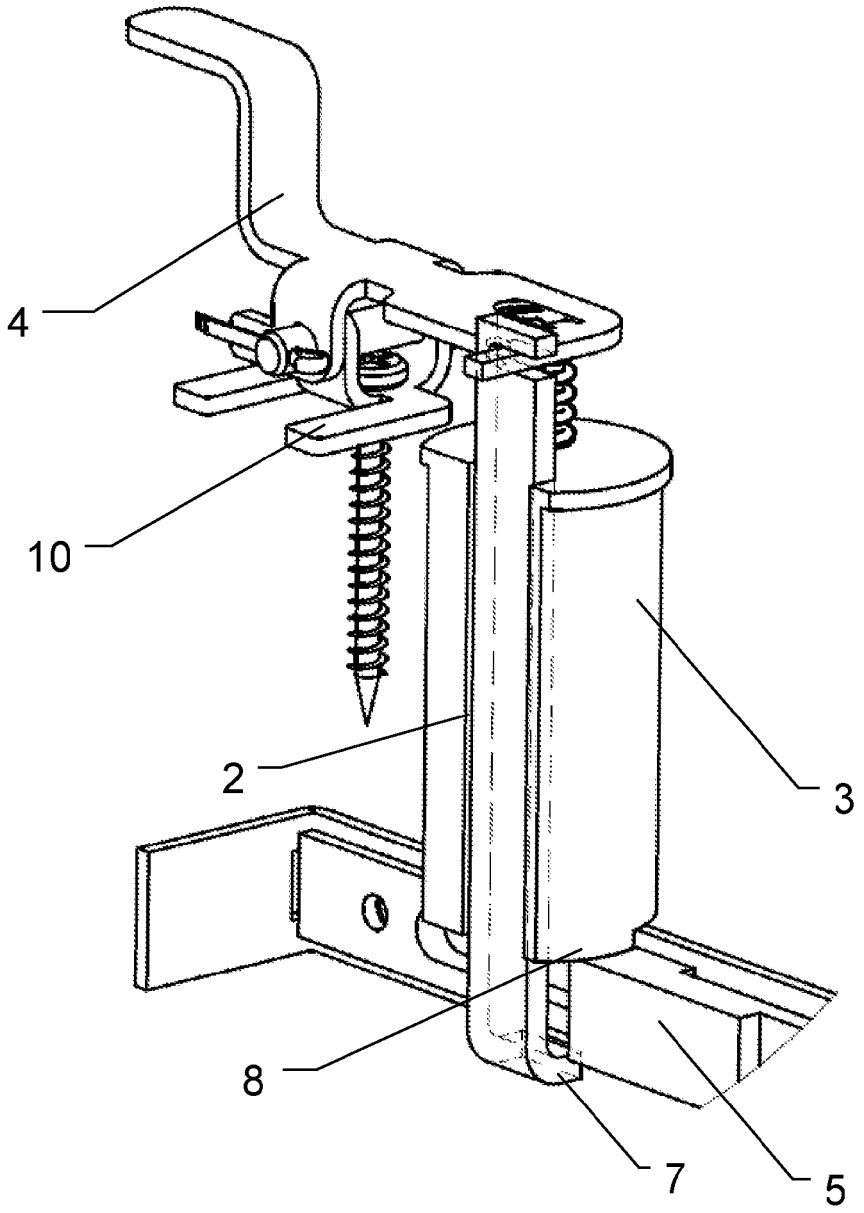

Fig. 2

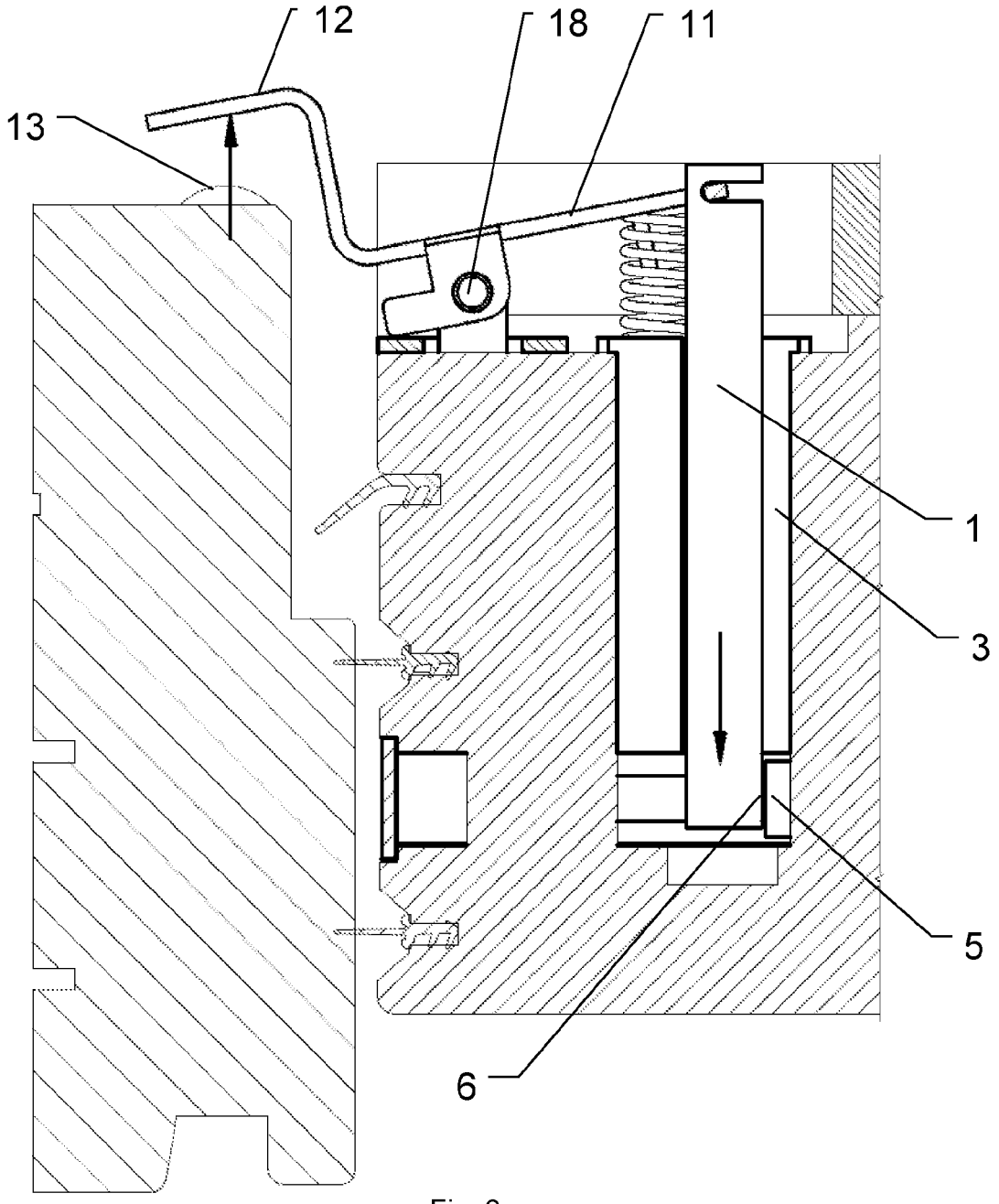

Fig. 3

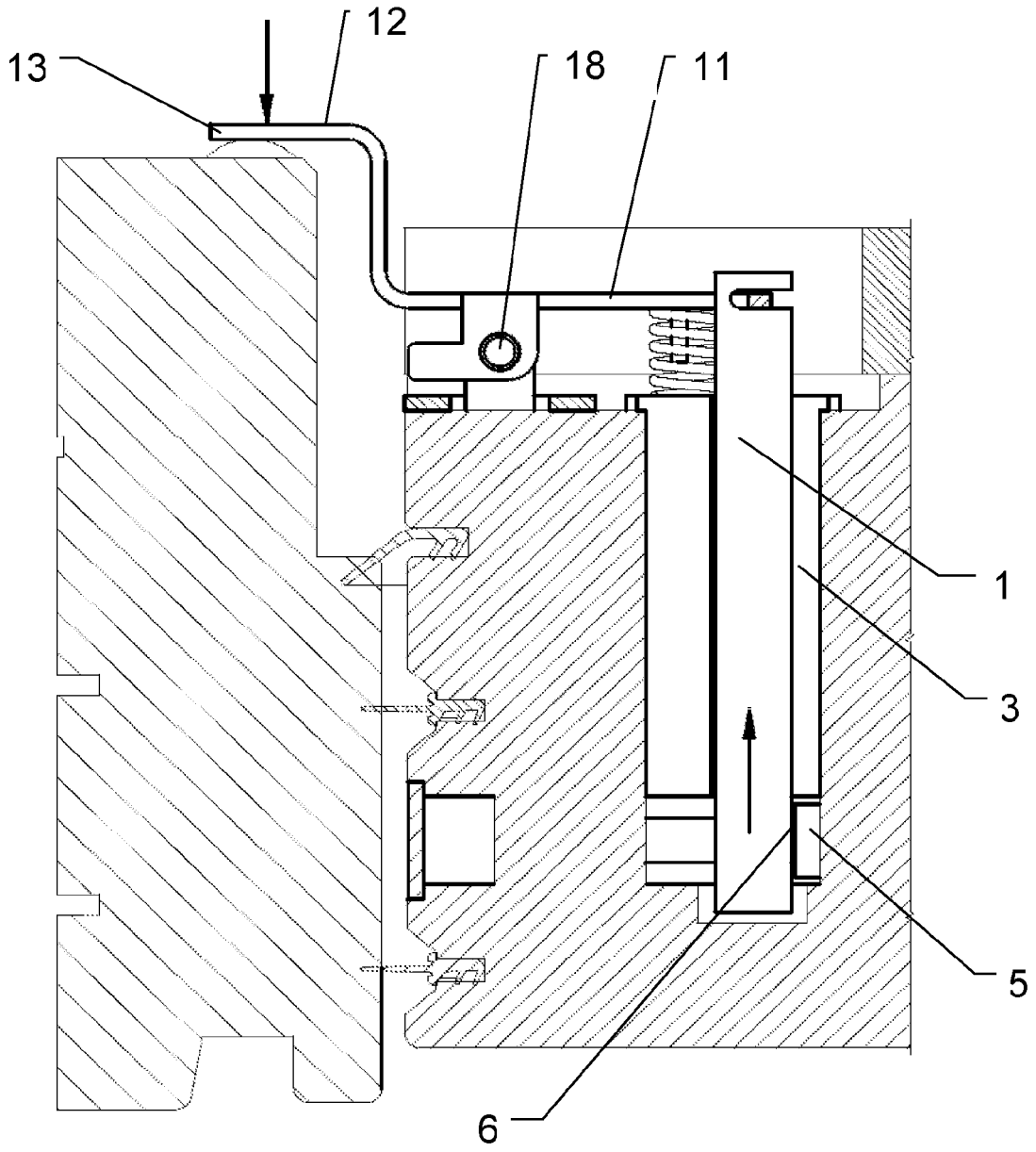

Fig. 4

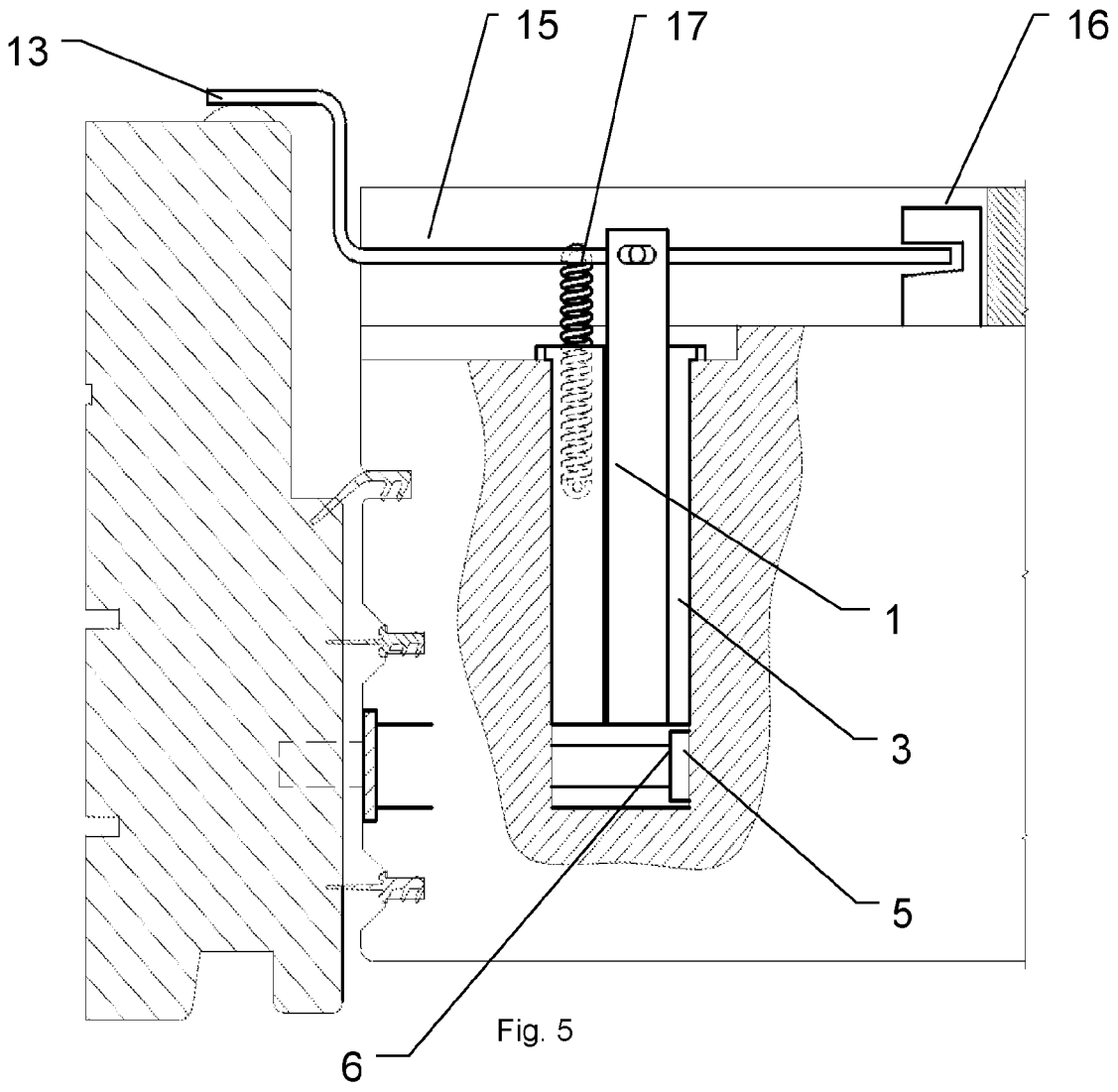

Fig. 5

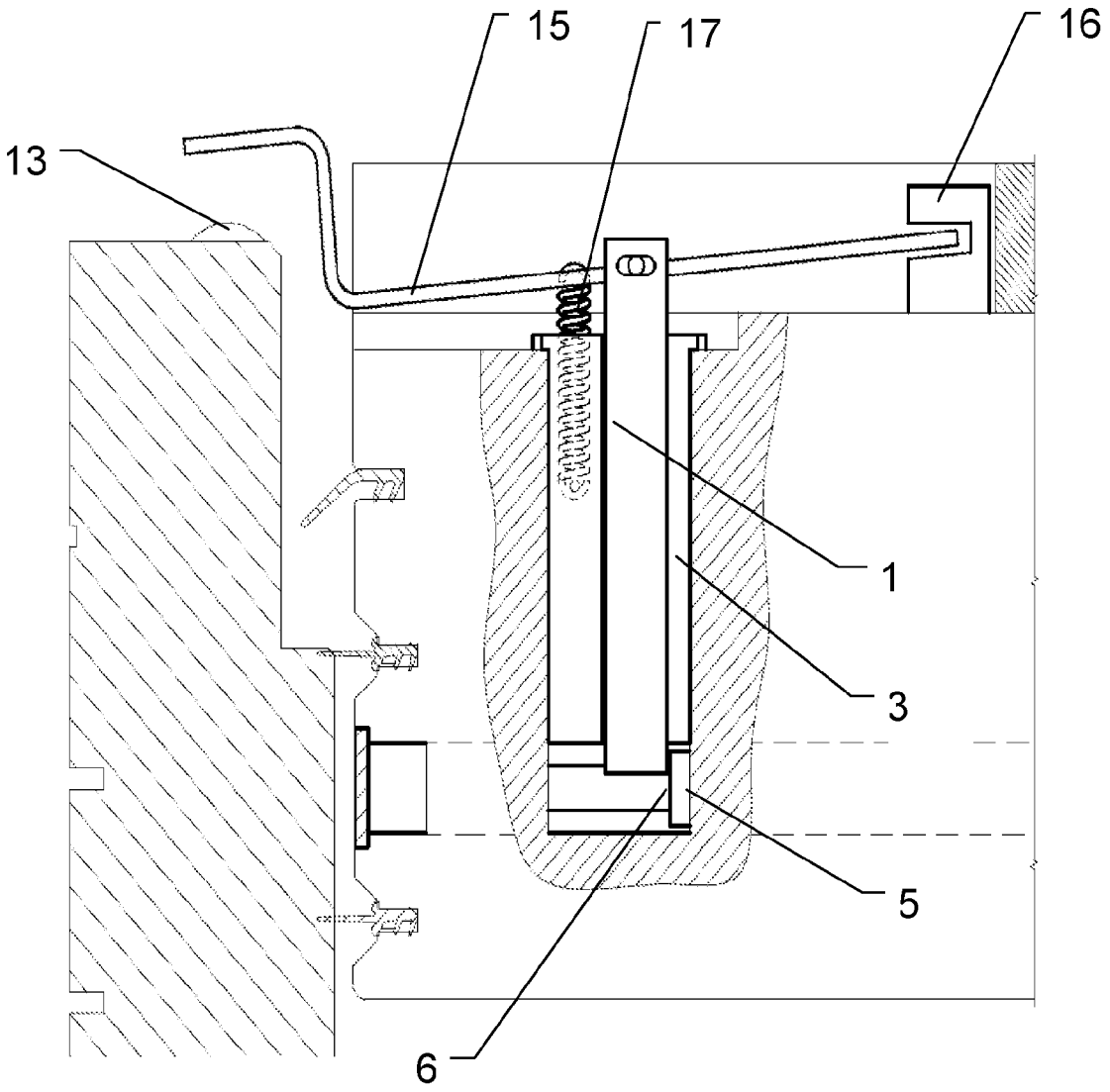

Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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